

# Generation of Computers

Growth in the computer industry is determined by the development in technology. Each phase/generation of computer development is characterized by one or more hardware/software developments that distinctly improved the performance of the computers of that generation. Based on various stages of development, computers can be divided into different generations.

## **The First Generation (1942-1955)**

The first generation computers used the concept of 'stored program' and were characterized by vacuum tubes. A vacuum tube is a delicate glass device that can control and amplify electronic signals. The first generation computers were made using thousands of vacuum tubes and were the fastest calculating devices of their time. These computers were very large in size, consumed lot of electricity and generated lot of heat.

UNIVAC 1 was the first electronic computer of this generation and was used for business applications.

### **Salient features of First generation computers:**

- Used vacuum tubes to control and amplify electronic signals
- Huge computers that occupied lot of space
- High electricity consumption and high heat generation
- Were unreliable since they were prone to frequent hardware failures
- Commercial production was difficult
- They were very costly and required constant maintenance
- Continuous air conditioning was required
- Programming was done in machine language although assembly language also started at the end of this generation Example : ENIAC , EDVAC , UNIVAC 1.

**Note:** ENIAC weighed about 27 tons, was of the size 8 feet \* 100 feet \* 3 feet and consumed around 150 watts of power.

## **The Second Generation (1955–1964)**

The second generation computers were characterized by transistors. A transistor is a solid state semiconductor device that revolutionized the electronic industry. Transistors were smaller, highly reliable, consumed less electricity and generated less heat. Also magnetic core memories were developed during this generation. These are tiny ferrite rings that can be magnetized in either clockwise or anticlockwise direction so as to represent binary 1 or binary 0. Magnetic cores were used as primary memories. Later

magnetic disks also came into existence and were used as secondary storage devices. All these new developments – transistors, magnetic core memory and magnetic disk storage devices made the computers more powerful and reliable. This further led to the existence of operating systems. Programming languages like FORTRAN, COBOL, Algol etc. also developed. Commercial applications of the computer increased and now the computers were used in business and industries for applications like payroll, employee management, inventory control etc. IBM 1401 and IBM 1620 were popular computers of this generation.

### **Salient Features of Second generation computers:**

- Use transistor based technology
- Were smaller and less expensive as compared to first generation
- Consumed less electricity and emitted less heat
- Magnetic core memories and magnetic disks were used as primary and secondary storage respectively
- First operating system developed
- Programming in assembly language and in the later part high level languages were used
- Wider commercial use but commercial production was still difficult
- They also required constant air-conditioning.

Examples: IBM 1401, IBM 1620, UNIVAC 1108

### **The Third Generation (1964-1975)**

In 1964, the Integrated Circuits or ICs or chips revolutionized the electronic industry and started the third generation of computers. An IC is a small silicon chip or wafer made up of extremely purified silicon crystals. It has numerous transistors, capacitors, resistors and other elements of an electronic circuit. A small scale integration (SSI) chip used to have about 10 transistors on a single chip and a medium scale integration (MSI) chip had about 100 transistors per chip. The size of memories also increased. Various mainframe computers and minicomputers were developed during this generation. Even operating systems with multitasking and multiprogramming features (you will learn about these terms in the next chapter) were developed. Since ICs made the computers highly reliable, relatively inexpensive and faster, computers these days were found in areas of education, small businesses and offices along with industrial and business applications. IBM 360 was a very popular third generation computer.

### **Salient Features of Third Generation computers:**

- Used integrated circuits
- Computers were smaller , faster and more reliable
- Low power consumption and less emission of heat as compared to previous generations

Examples: IBM 360 series, Honeywell 6000 series

## **The Fourth Generation (1975 onwards)**

In this generation Large Scale Integration (LSI) and Very Large scale integration (VLSI) technology was used by which up to 300,000 transistors were used on a single chip. Thus integration of complete CPU on a single chip was achieved in 1971 and was named microprocessor which marked the fourth generation of computers. The computers based on microprocessor technology had faster accessing and processing speeds. In addition to this the increased memory capacity further made the computers more powerful and also more efficient operating systems were developed for these computers. New concepts of micro-programming, application software, databases, virtual memory etc were developed and used. The computers that we use today belong to this generation. These portable computers can be carried from one place to another owing to their compact size. They are much more accurate. Even memory sizes have become phenomenal. Commercial production of these computers is easier and they are the least expensive, compared to the earlier generation computers. Also computer networks starting coming up during this generation. It is today one of the most popular means to interact and communicate with people.

### **Salient features of Fourth generation Computers**

- ICs with LSI and VLSI technology
- Microprocessors developed
- Portable computers developed
- Networking and data communication became popular
- Different types of secondary memory with high storage capacity and fast access developed
- Very reliable ,powerful and small in size
- Negligible power consumption and heat generation
- Very less production cost

## **Fifth Generation Computers**

Fifth Generation computers are still under development. This generation is based on the concept of artificial intelligence. In simple terms the computers of this generation are supposed to behave like humans. The principles of parallel processing (many processors are grouped together) and superconductivity are being used to develop devices that respond to human languages and will have the ability to apply previously gained knowledge to execute a task. They will let them make decisions of their own to execute a task. Some applications like voice recognition, visual recognition are a step in this very direction.

### **Salient features of fifth generation computers:**

- Parallel Processing
- Superconductivity
  
- Artificial Intelligence